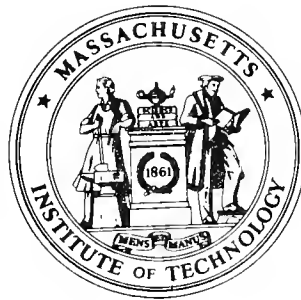


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Chinese and Indian Agriculture:
A Broad Comparison of Recent Policy and Performance*

by
Pranab Bardhan

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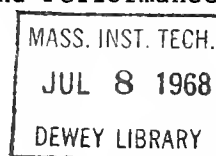
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* The views expressed in this paper are the author's sole responsibility, and do not reflect those of the Department of Economics, nor of the Massachusetts Institute of Technology.

Chinese and Indian Agriculture:
A Broad Comparison of Recent Policy and Performance*

Pranab K. Bardhan

I

For a number of obvious reasons the pace and pattern of recent economic development in China and India invite a systematic comparison. It is always interesting to measure and compare the progress of these two great neighbours, comprising a large fraction of the world's poorest people, both having recently launched massive programmes of expansion and development after centuries of foreign domination, chaos and stagnation. Over and above that, the significant differences in the institutions and policies the two countries have chosen to adopt for attaining broadly similar economic goals make a comparative study even more exciting to all social scientists. Nevertheless, a careful and thorough study of the matter is hard to come by,¹ and one very often has to remain satisfied with superficial journalistic accounts.²

*For useful discussion and comments I am grateful to Kalpana Bardhan, Richard Eckaus, Charles Kindleberger, Edwin Kuh, Dwight Perkins, Michael Postan, and Paul Rosenstein-Rodan. Needless to add, all errors remain mine alone.

¹There is a well-known article by Malenbaum [23] contrasting the general development performance of the two countries in the period 1950-58. Our discussion goes into somewhat more detail as it is concentrated on the agricultural sector alone. Besides much has changed in both economies since 1958 and we take into account a lot of information relating to this later period (as well as new information on the earlier period). More recently, Raj [30] has gone into an illuminating general discussion of Chinese economic policy in contrast to Indian. Ishikawa's recent book [15] also provides a very useful framework for a comparative study of agricultural development 'in Asian perspective.'

²In numerous textbooks on comparative economic systems we found elaborate comparisons of the American and Soviet economies but hardly any mention of a China-India comparative study, which, in our opinion, should be a very important part of any discussion on comparative economic systems in the present world.

This is particularly true with respect to agriculture. Although in both countries the major emphasis is on rapid industrialization, because of the predominantly agrarian nature of the economies in both countries the agricultural sector provides the basic foundation for industrial expansion with supplies of food, raw materials, and labour, with markets for industrial goods and with foreign exchange earned through exports of primary products.³ In both countries the pace of industrial advance is severely constrained by the vagaries of agricultural production, much more decisively than has been the case, say, in the Soviet Union in the first two decades of planning.⁴ Agriculture, therefore, is the key sector, and yet detailed comparisons of the two economies on the agricultural front are very rare. Undoubtedly, the major reason for this is that in both countries the state of availability and, in particular, reliability of economic information is worst with respect to agriculture. Even apart from problems of comparability of data across countries and problems of sheer non-availability of data at a national scale on many significant points, continuous changes in coverage and reporting systems, occasional cases of deliberate mis-reporting in official data (as, for example, is widely suspected of Chinese official production figures for 1958 and 1959) and frequent cases of one's being obliged to rely on sources that are not reputed for their impartiality (this is particularly serious because matters

³In both countries dependence on agriculture as a direct source of income is also very substantial, even after all these years of industrialization. In India the share of agriculture (including animal husbandry, forestry and fishery) in the net national produce in 1948-49 prices was 48.6% in 1952-53 and 43.2% in 1964-65. In China, the share of agriculture in net domestic product in 1952 prices was 46.1% in 1952 and 34.4% in 1965 according to estimates based on official data recomputed on the standard concept of net domestic product including incomes originating in the 'non-productive' sectors (the estimate for 1965 is very crude because of the fragmentary nature of official data available). See Ta-Chung Liu, [22], pp. 56-63, 68-69. One should note here that the prices at which output is valued being more favorable to industry in China than in India, the relative share of modern industry in national income appears larger in China than would be the case if a comparable structure of relative prices were used in national income estimation in both countries.

⁴See on this Tang [38], for example.

relating to Communist China tend to evoke very strong feelings in some quarters) are bound to frustrate the most heroic of research workers interested in a comparative study. Any such study is, therefore, grossly limited in its accuracy of appraisal, and the present paper is no exception. It is offered in the hope that despite the severe limitations on information, it may not be impossible to derive some rough generalizations, and in view of the importance of the subject, it may be worthwhile to draw attention to them. At the same time one has to bear in mind that whatever results this paper has should not lead anyone to jump to decisive ideological conclusions about the success or failure of a particular political system. Apart from the non-reliability of data, we have to take account of the numerous extraneous factors that complicate the actual operation of a system making it very difficult to have any straightforward judgement particularly in the relatively short period under consideration.

The period of comparison that we take is generally between 1952-53 and 1964-65. The initial and the end years are chosen in view of the fact that they happen to be good-to-average years in both countries in terms of crop weather, an important factor in comparisons over time and space for all weather-dependent agrarian economies. To be fair, one should point out here that the choice of 1964-65 as the end-year biases the scale somewhat in favour of India. This is because for China the period 1952-65 includes the disastrous years of 1960-61 (which saw the worst crop weather in many decades) causing, along with other reasons, a serious setback in production to be recovered over the span of the next four years and thereby substantially depressing the rate of growth for the entire 13-year period, whereas for India the similar spell of disastrous years came after the bumper crop-year of 1964-65. We should also mention that for India we have relied solely on published official data⁵ and for China, because of a lack of such official data in

⁵Most of the information on India we have used is from publications of the Ministry of Food and Agriculture and of the Planning Commission. In this paper we explicitly mention the source of Indian data when it is different from either of these two sources.

the 1960's, we occasionally had to rely on such fragmentary and very rough information that some Western observers--not always overflowing with sympathy for the Communist cause in China--have gleaned from all kinds of indirect and circumstantial evidence. This also might have biased our calculations.

In Section II we consider relative performance in agricultural production and productivity in the two countries; in Section III we discuss the trends in use of inputs and the pattern and effectiveness of investment in the agricultural sector; in Section IV we study the framework of land relations in which the agricultural sector operates in the two countries, and Section V provides a brief overall conclusion.

II

The agrarian economies that the Communists inherited in China after Liberation and the Congress Government did in India after Independence were broadly similar in their essential structure and in the major problems afflicting them, with acute population pressure on limited arable land resources, with preponderance of subsistence farming and semi-feudal land relationships, with continuous subdivision and fragmentation of land holdings, widespread rural unemployment and underemployment, with peasants often having neither the ability nor the incentive to introduce improved methods of cultivation, with land lords, traders and village money-lenders channeling most of their investible funds into consumption credit (at exorbitantly high rates of interest), land purchases and speculation, with miserable transport and marketing conditions and, in general, with the prevalence of a self-perpetuating spiral of backwardness and poverty. For the first time in their recent history in both the countries, the new governments seriously committed themselves to long-run programmes of agricultural transformation. By 1952, both the economies had substantially recovered from the disruptions and dislocations of

the preceding decade and the minimum technical and organizational foundations for long-range planning had been laid. From this standpoint also, 1952 is a good starting point for a study of both the countries.

Beginning in 1952, let us now have a look at the production trends. The major component of agricultural production in both the countries is, of course, foodgrains.

Table 1

Production of Foodgrains (processed) in Million Tonnes

China:		India:	
1952	131.2	1952-53	61.68
1957	157.3	1956-57	72.35
1965	170.0	1964-65	89.00

Notes and Sources of Data: See Appendix

Since China has a much larger population than India, a more meaningful comparison is that of per capita foodgrains production.⁶ Assuming a Chinese population of 575 millions at the end of 1952 (as given by the State Statistical Bureau), and taking the official estimate of foodgrains for granted, per capita production of processed foodgrains in China was 228.2 kg. in 1952, whereas in India it was 164 kg. in 1952-53. Thus the Chinese per capita amount of processed foodgrains production was about 39% higher than the Indian amount around 1952.

Assuming a population of 728 millions in China in 1965, from Table 1 we may say that the per capita production of processed foodgrains in China was about 233.5 kg. in 1965, whereas in India it was 182 kg. in 1964-65. Thus the Chinese per capita amount of foodgrains production was about 28% higher than the Indian

⁶The estimates of per capita foodgrains production for China should be taken as very crude approximations; among other things, the population figures underlying them are subject to doubts by some observers. The population figures for 1960 and 1965 are those used by Edwin Jones [17] p. 93. For 1965, Jones takes the official estimate after the mid-1964 "census" and projects it to the end of 1965. Population estimates and projections on the basis of several alternative hypotheses made by John Aird [1] seem to suggest that 728 millions for 1965 is an underestimate. For a contrary view, however, see W. Klatt's comment in China Quarterly, July-September 1967.

amount around 1965.

Even in the crisis year of 1960 in China, per capita production of processed foodgrains (assuming a Chinese population of 676 millions) seems to have been about 2% higher than the Indian amount for 1960-61 (which was a normal year in India).⁷

India, of course, has been much more dependent on imports of foodgrains than China. Imports of foodgrains in India increased from an annual average of 3.8 million tonnes during the Second Plan to more than 6 million tonnes during the Third Plan. Even in the bumper crop year of 1964-65 imports of foodgrains amounted to about 7% of output. China has turned from a grain-exporting country in the 1950's to a net importer of grains in the 1960's, but her imports of about 5 million tonnes of grains has not exceeded 3% of output in any of the years.

Let us now have a look at the rates of growth in production and yield per acre over the 12-13 years under study. From Table 1, the average (linear) rate of growth⁸ of foodgrains production in India between 1952-53 and 1964-65 is 3.7%. If we calculate the linear rate of growth for India between the average of 1951-52 and 1952-53 and that of 1963-64 and 1964-65, the figure remains the same, i.e., 3.7%. From Table 1, the average (linear) rate of growth of foodgrains in China between 1952 and 1965 is 2.3%. If we calculate the linear rate of growth for China between the average of 1951 and 1952 and that of 1964 and 1965, the figure is 2.9%.

It might be interesting to compare these rates of growth with similar rates of growth in Japan after Meiji Restoration. According to estimates by Yamada, the

⁷It is assumed that the output of foodgrains in China in 1960 was 150 million tonnes, the figure mentioned by Mao to Viscount Montgomery as reported in The Sunday Times, October 15, 1961.

⁸By this we have meant the total percentage change over the years divided by the number of years. We have not calculated the rate of growth in either country on the basis of 3-year moving averages particularly because of a lack of reasonably reliable year-to-year data for China after 1957.

average (linear) rate of growth of agricultural output⁹ in Japan between 1880-84 and 1915-19 was about 2.5%.¹⁰

In both India and China the period under consideration should, however, be broken down into two distinct parts, the earlier phase of larger growth and later phase of smaller growth. Between 1952-53 and 1958-59, Indian output of foodgrains grew at a linear rate of 4.6% per annum; whereas between 1958-59 and 1964-65, the rate was 2.18%. In China, from Table 1, the corresponding linear rate of growth was 3.96% per annum between 1952 and 1957, and only 1.01% between 1957 and 1965 (the latter being largely influenced by the three years of severe agricultural crisis in this period--for India the crisis years came after 1964-65).

Yields per acre in foodgrains production are much larger for China and Meiji Japan than in India, as can be seen from Table 2.

⁹The rates of growth for India and China mentioned above are, of course, for foodgrains alone and not for total agricultural production. For India the linear rate of growth of total agricultural production between 1952-53 and 1964-65 on the basis of 3-year moving averages was 3.2%. The Chinese rate of growth of total agricultural production is likely to have been slightly lower than that of foodgrains.

The most important non-food crop in China is cotton. Its output went up from 1.3 million tonnes in 1952 to 1.64 million tonnes in 1957, then there was a substantial drop in production and it crept up to 1.4 million tonnes in 1965. Since 1959, shift of acreage from non-food crops to food crops has resulted in a relatively slow rate of growth of the former. See Jones [17].

In India, at least up to 1963, movements in relative prices of cash crops to food crops were favorable to the former, and much shift of acreage (as well as inputs like fertilizers and water) took place. Between 1952-53 and 1964-65 acreage under foodgrains grew at a linear rate of 1.26%; the rate was 2.62% for non-foodgrains.

¹⁰This is as reported in Johnston [16].

Recently some of the past estimates of growth in agricultural production in Meiji Japan have been seriously questioned by Nakamura [24] who shows that agricultural production was grossly underreported in the earlier part of the Meiji era as a tax evasion device, and that this underreporting tended to decline over time. According to Nakamura's own estimates, the average linear rate of growth in the same period ranges between 1% to 1.6%. Yamada has now undertaken a careful revision of official estimates, and arrives at a rate of growth smaller than that of, say, Ohkawa [27] but much higher than that of Nakamura.

Table 2

Yields per Hectare in Foodgrains (in tonnes)

	China		India		Meiji Japan ¹¹	
	1952	1965	1952-53	1964-65	1878-82	1918-22
Rice	2.41	2.96	0.81	1.07	2.53	3.79
Wheat	0.73	0.85	0.78	0.9		
All Foodgrains	1.37	1.6	0.59	0.75		

Notes and Sources of Data: See Appendix

From Table 2, yield per hectare grew at a linear rate of 1.8% for rice and 1.3% for total foodgrains in China¹² between 1952 and 1965, at a rate of 2.7% for rice and 2.3% for total foodgrains in India between 1952-53 and 1964-65, and at a rate of 1.2% for rice in Japan between 1878-82 and 1918-22.¹³

Two points seem worth noting here. The example of Meiji Japan is often singled out as a case of a very impressive growth rate in yields per acre in an underdeveloped, overpopulated agricultural economy. Even ignoring Nakamura's statistical doubts, that rate of growth seems to have been exceeded in China and India in recent years. One major explanation is the higher initial base for Meiji Japan; another is relatively low investment¹⁴ in Meiji agriculture. Secondly, it

¹¹For pointing out an error in the use of conversion figures for Japanese weights and measures in the earlier draft, I am grateful to Henry Rosovsky.

¹²It is interesting to note, as Ishikawa [15], p. 77, points out, that China had attained the 2.3 tonne level of per-hectare rice yield by the 10th century (with the establishment of the present-day notation pattern), and that it has been nearly stagnant since then, until very recently.

¹³If one accepts Nakamura's estimates, the rate is, of course, much lower, far below 1%. See Rosovsky [32] for a critique of Nakamura's estimates.

¹⁴See, e.g., Rosovsky [31].

is sometimes thought that compared to China and Meiji Japan, in India a relatively small proportion of the recent increase in production has been due to increase in yields per acre and the major source of agricultural growth has been acreage expansion. This might have been valid for India in early fifties, but for the period of 1952-64 as a whole the opposite seems to be true from the figures above. This, of course, does not imply less urgency in the need for more substantial increase in yields per acre. As we have noted above, the absolute levels of yield per hectare are far smaller for India than for China and Japan.

III

Let us now consider the trends in use of inputs.

Gross sown acreage under all crops was 151.1 million hectares in China in 1955 and 156 million hectares in 1965.¹⁵ In India it was 144.2 million hectares in 1954-55 and 153.8 in 1964-65. The two countries, in spite of sizeable differences in geographical area and population, have a relatively similar amount of gross sown acreage under all crops. In both countries the possibilities of further expansion of acreage are very limited, and the most promising means of increasing production is, and will increasingly be, more intensive and efficient cultivation of existing farmland.

Chinese land is far more intensively cultivated than in India. The index of multiple cropping (i.e., the amount of gross sown acreage as a proportion of net sown acreage under all crops) was 137.2 in China in 1955 and 143.1 in 1965; in India it was 112.8 in 1954-55 and 114.8 in 1963-64.

A major factor in improving (and even maintaining) soil fertility and increasing crop yields is the supply of soil nutrients in the form of organic manure and

¹⁵ See State Statistical Bureau [36] and Jones [17].

chemical fertilizers. Through centuries farmers in both countries have been applying substantial amounts of organic manure and it is still the major source of crop nutrients. Information on the use of organic manure is very scanty, but it seems that the Chinese farmers use a much larger quantity of organic manure (in terms of plant nutrients) than their Indian counterpart. According to rough estimates, organic manure provided about 3.8 million tonnes of N (as is well known, both Chinese and Indian soils are most deficient in nitrogen) in China in 1956 and about 0.97 million tonnes of N in India in 1955-56.¹⁶ Although in both countries animal manure¹⁷ is the major source of organic fertilizers, green manuring is increasing at a rapid rate. Green manure acreage increased from 4.78 million hectares in 1960-61 to 7.53 million hectares in 1964-65 in India, and from 3.2 million hectares in 1957 to 5.3 million hectares in 1965 in China.¹⁸

But even substantial increases in the supply of organic fertilizers will be grossly insufficient in view of the fertilizer requirements for the desired growth in agricultural production in both countries. The consequent need for a huge expansion of chemical fertilizer production and consumption is recognised by both Governments. In both countries the use of chemical fertilizers in agriculture is of comparatively recent date, and the amounts used per hectare are miserably low relative to countries like Japan today. Comparing India and China, it seems that the amount of nitrogenous, phosphatic and potassic fertilizers used per hectare is more than twice as large in China as in India around 1965.

¹⁶See Dawson [6] , p. 138 and N. C. A. E. R. [25], p. 123.

¹⁷Walker [41] extensively discussed the relationship of changing availabilities of pig-manure in China with the Government's policy changes towards the small private plots of peasants.

¹⁸See Jones [17].

Table 3

Consumption of Chemical Fertilizers per Hectare
of Gross Cropped Area ($N+P_2O_5+K_2O$ in Kilograms)

China:		India:	
1955	1.7	1955-56	0.9
1965	10.2	1964-65	4.9

Sources of Data: See Appendix

From available data it also seems that China has made much bigger strides in domestic production of fertilizers. China produced only 39% of her total consumption of chemical fertilizers in 1954 and 64% in 1965. India, on the other hand, produced 77% of her total consumption of N and P_2O_5 in 1955-56, and 52% in 1964-65. In fertilizers, China's import-dependence has declined whereas India's has increased.

For effective application of chemical fertilizers, as for normal crop growth and more intensive cropping, an adequate supply and regulated use of water is necessary. In the last two decades a great deal of water conservancy and irrigation programmes have been carried out in both countries. According to Indian official data, gross irrigated area under all crops was 23.2 million hectares (16.9% of gross cropped area) in 1952-53, 25.7 million hectares (17.2%) in 1956-57 and 30.6 million hectares (19.5%) in 1963-64.

For China, an assessment of the irrigation programmes is more difficult because of a lack of data particularly for the later years and a variety of conflicting reports from official and semi-official sources, although there is no doubt that throughout the period irrigation projects on a massive scale had been undertaken and completed.¹⁹ One of the most competent official sources of technical

¹⁹ Official reports claim that between 1949 and 1960 an estimated 50 billion man-days were spent on water-conservancy projects and a total of 70 billion cubic meters of earthworks and masonry--equivalent to excavating 960 Suez Canals--were completed.

information places the 1952 total of irrigated area at 23.4 million hectares (this is an underestimate according to some Western observers) and the 1957 total at 38.3 million hectares (about 24% of the gross cropped area).²⁰

As in India, so in China, the increase in effective irrigation is much less than the potential created. Chinese engineers have stated that water from some of the projects never reached the farmer's land and that in other cases salinity and waterlogging developed because of high seepage from the large irrigation systems and inadequate drainage. In 1957 the Vice Minister of Water Conservancy stated that about 30% of the area reported under irrigation was incapable of resisting drought. In August 1959, Premier Chou En-lai stated that only 33.3 million hectares (which was only half of the area claimed to be under irrigation at that time) could be adequately irrigated. Data on irrigation since that period are tenuous and it is very difficult to have a clear idea. Dawson [7] seems to think that the area irrigated by 1964 may have reached some 46 to 50 million hectares; i.e., about one third of the total gross cropped area, which is much larger than the proportion in India.

It is well known in India that a substantial portion of the irrigation potential created is not utilized (because of, among other things, a lack of funds and incentives on the part of farmers to construct water courses and field channels, inappropriate phasing and coordination, etc.), although with recent measures of the Government in this direction, the utilization rate is improving. From official data it can be calculated that only about 48% of the additional major and medium irrigation potential created since 1950-51 was utilized by 1955-56; the figure has gone up to 77% by 1964-65.

Considering the extent of annual harvest fluctuations it is probably true to

²⁰ 'Statistical Data of China's Irrigated Area in Recent Years,' Hydroelectricity No. 7, April 11, 1957.

say that in spite of great improvements, the agrarian economies in both the countries are still considerably vulnerable to periodic floods and droughts. Besides, in both countries the major emphasis (more in India than in China) has been on the protective harvest-stabilizing aspects of water projects; only in very recent years irrigation has started playing the more positive role of facilitating the use of improved farming techniques. It is also interesting to note that in both countries there has been a similar change in irrigation policy in recent years. In both countries attention has been remarkably shifted from constructing new large-scale grandiose projects to the development of numerous minor²¹ irrigation projects and to the consolidation of existing projects by building auxiliary works and other improvements.

Apart from fertilizers and water, another--quite often complementary²²--crucial input in transforming traditional agriculture is improved seeds. In India, area sown under improved seeds increased from 1.3% of total gross cropped area in 1955-56 to 29.5% in 1964-65. In China, according to official data, it went up from 4.7% in 1952 to 77.5% in 1958 for area under foodgrains and from 50.2% in 1952 to 97.0% in 1958 for area under cotton.

In the application of new inputs there has been in recent years a remarkably similar shift in policy in both countries towards concentrating a large proportion

²¹ Throughout the period, however, the proportion of minor to major irrigation projects has been much higher in China than in India. See Ishikawa [15], p. 152.

²² Another complementary input, to some extent, is labour on the farm. We have not discussed this in detail in this paper. For a good discussion of the contribution of additional farm labour to agricultural output on the basis of farm economic surveys in India, China, and Japan, see Ishikawa [15], Chapter 3. We might only note here Ishikawa's conclusion that it is very rare to find cases where an increase in per-hectare input of labour is associated with an increase in per-hectare output without any paralld increase in certain other inputs and that there is a very high degree of complementarity between the labour input and inputs like fertilizers and irrigation. The higher levels of irrigation and fertilizers (both organic and inorganic) in China largely explain the correlation between larger input of labour and yields per hectare in China compared to India.

of new inputs and administrative and technical personnel on a few selected districts. In India an Intensive Agricultural District Programme was undertaken in 1960-61 for some districts selected on the criterion of maximum irrigation facilities and a minimum of natural hazards where the cultivators were induced to adopt an integrated and intensive use of improved agricultural practices. The supply of high-yielding varieties of seeds, fertilizers, pesticides, etc., is pre-empted in favour of these selected areas which now constitute about 5% of the total cultivated area in the country. However, as the Draft Fourth Five Year Plan observes, 'evaluation done so far has shown that with the exception of some districts, progress has not matched expectation.'

In China also certain areas--particularly in Yangtze and South China lake plains and deltas--have been selected for concentrated effort. These 'modernizing' areas seem to constitute not more than 10% of the farmland. According to Jones [17], marked results seem to have been achieved at relatively low total and State costs on these limited areas. Prosperous communes in these areas have sometimes provided the major part of the cost of investments, thus limiting State subsidies.

An important point to note here is that the mechanism for siphoning off some part of the agricultural surplus in these favoured areas is more effective in China than in India, and this is a significant determinant of the efficacy of these package programmes from the point of view of the economy as a whole.

On the general question of investment as well as price policy, there is a widespread impression that in both the countries the agricultural sector has been relatively neglected. Let us first briefly take up price policy.²³ The major price policy in China has been the adjustment of Government purchase prices to stimulate or control agricultural production. The agricultural purchase price index went up sharply from 100 in 1950 and 121.6 in 1952 to 148.8 in 1957 and 188.3

²³For a detailed discussion of price policy in China, see Perkins [28] and Swamy [37]. For a good summary of the different aspects of price policy in India see Dantwala [4].

in 1963; whereas the rural retail price index for industrial products went up from 100 in 1950 and 109.7 in 1952 to 112.1 in 1957 and 125.4 in 1963.²⁴ Thus the "terms of trade" have in general shifted in favour of the agricultural sector.²⁵ For India data are not available on rural retail prices of industrial products for the country as a whole over a long enough period. In Table 4 we have estimated the ratio of indices of wholesale prices of some of the major manufactured consumables (cotton manufactures, sugar, edible oils and 'fuel, power, light and lubricants') purchased by the agricultural sector to those of agricultural commodities. It seems that in general there has been some (although not very large) decline in the relative price for the agricultural sector. On the other hand, the wholesale price of the purchased input of fertilizers has declined substantially relative to that of agricultural commodities between 1952 and 1964.²⁶

Table 4

Wholesale Price Index of Agricultural Commodities
Relative to Manufactured Consumables (1952-53 = 100) in India

1952-53	1953-54	1954-55	1955-56	1956-57	1957-58	1958-59	1959-60
100	101.8	91.9	89.7	94.2	92.9	98.7	97.7
1960-61	1961-62	1962-63	1963-64	1964-65			
96.6	94.9	93.8	94.5	104.6			

Notes and Sources of Data: See Appendix

²⁴ These data are from Perkins [28], p. 30, except for the 1963 figures which are from Swamy [37].

²⁵ One should, however, point out that compared to the pre-war period the 1952 prices of agricultural relative to industrial products were in favour of the latter in China and the former in India.

²⁶ This has been true in China too as is evident from 1950-58 data for the retail price index of Ammonium Sulphate in China as reported in Swamy [37], Table 11.

In both countries prices of new inputs, like fertilizers, relative to those of farm products are still very high in comparison to other countries. See, for example, Table 5.²⁷

Table 5

Price of N relative to that of rice in different countries in 1957

India	3.22
China	12.4
Japan	2.12
U.S.A.	1.46

Sources of Data: See Appendix

But since on all calculations the net return of fertilizers is often so very large at the present low rates of application in both countries, even after taking into account the extremely high fertilizer-crop price ratios, demand tends to outstrip supply of fertilizers. In both countries the major bottleneck in the extension of fertilizer use has been its availability.

Let us now take up the question of fixed investment in agriculture. According to estimates by Hollister [12] the agricultural sector in China accounted, on an average, for about 23% of gross fixed investment in the economy in 1952-59. This includes, apart from state investment, investment by agricultural cooperatives and individual farmers. In India gross investment in agriculture and allied activities

²⁷From Table 5, the fertilizer-crop price ratio seems to be much higher in China than in India. But at the same time data derived from a large number of fertilizer trials conducted on farms in both countries seem to indicate that at equivalent doses of N per hectare, increase in rice yield per unit of N is much larger in China than in India. See, e.g., V. G. Panse, 'Fertilizer Recommendations' in Proceedings of National Seminar on Fertilizers, Fertilizer Association of India, 1965; and Jung-Chao Liu [20] [21].

constituted about 20% of total gross investment for the period 1951-52 to 1960-61.²⁸ These figures for investment allocation to agriculture are not very high, nor are they extremely low, particularly for a country with an urgent programme of industrialization. Certainly the share of investment used in building the industrial base of the economy was much higher in both countries (higher in China than in India), but then no country aiming at structural transformation of the economy can be expected to allocate investment in proportion to existing sector shares in national income. Besides, in Asian agriculture investment in fixed capital may not always be the most important determinant of any significant productivity rise. One may also note here that in more recent years under pressures of agricultural crises the share of investment going to agriculture has appreciably increased in both countries.

Even if complaints about neglect of agriculture in investment allocation are justified, there are probably stronger reasons to question the effectiveness of investment that has been made in the agricultural sector and also (this is particularly true in India) the appropriateness of the investment priorities actually followed within the industrial sector itself. Let us take the second aspect first. In India, in spite of planners' intentions to the contrary, while industries catering to luxury and semi-luxury consumption have often spawned an undue amount of investible resources including foreign exchange (this has been made possible largely due to the extremely unequal income distribution pattern and loose government control over investment) and sometimes over-fulfilled their production targets,²⁹ investment and production performance have fallen grossly

²⁸ See Datta Roy Choudhury [5] . It should be pointed out here that the estimate for China is at current prices and excludes change in inventories, whereas the Indian estimate is at 1960-61 prices and includes change in inventories.

²⁹ As, to cite only two examples, in cases of sugar and rayon and staple fibre.

short of the desired pattern in respect of, say, chemical fertilizers³⁰ (as in machinery-producing industries).

In China also up to the end of the First Five Year Plan too low a share of investment went into increasing chemical fertilizer production. In recent years, however, their rate of growth of production of chemical fertilizers has exceeded that of India.³¹

As for effectiveness of investment, agricultural programmes in both countries have suffered from serious technical deficiencies as well as poor management and coordination. For the Chinese case let us quote from Eckstein's [8] general evaluation on this point. "Agricultural cadres often paid so little attention to the relationship between planting distance, depth of ploughing, soil moisture, crop strain, and soil fertility that applications of chemical fertilizer were at times not only wasted but even counter-productive. Similar difficulties plagued water conservation to an even greater extent."³² Thus, it was officially admitted that 40-60 percent of the water in the large irrigation systems was lost through leakage. This high seepage, coupled with inadequate drainage, caused water logging and sometimes serious alkalization and salinization. The fact that local cadres were

³⁰In the Third Five Year Plan period less than 30% of the target was achieved in production of both nitrogenous and phosphatic fertilizers. In the Second Plan period also, actual production at the end year was 34% of target in nitrogenous fertilizers and 45% of target in phosphatic fertilizers.

³¹Chinese performance in the production of agricultural machinery and implements has also been substantially better than that of India, particularly in recent years, although in neither country for obvious reasons of factor proportions agricultural mechanization is an immediate objective. Chinese production of powered machinery for irrigation and drainage went up from 0.56 million HP in 1957 to 7.28 million HP in 1964, that of tractors from 2720 in 1953 to 124,000 in 1964 and that of medium and small-scale agricultural machinery and implements quadrupled between 1957 and 1965; see Kojima [18], Table 3. In India the production of tractors was negligible in 1955-56 and was 5,600 in number in 1965-66; that of power-driven pumps went up from 37,000 in 1955-56 to 200 thousand in 1965-66, and that of diesel engines (stationery) from 10 thousand to 500 thousand in the same period.

³²It is to be remembered that water conservation absorbed a major portion of agricultural investment. Investment in water conservation constituted an estimated 62% of total state investment for capital construction in agriculture during the First Five Year Plan. See Ishikawa [13] pp. 161-63.

under tremendous pressure to fulfill and overfulfill the extremely ambitious targets for water conservation encouraged the withdrawal of land from cultivation in some areas. Technical deficiencies of these types characterized water conservation projects from the early 1950's on, but they became particularly pronounced during the Great Leap. The downgrading of the expert and the decentralization of economic management were felt perhaps more in this field than in any other. In the pursuit of the 'mass line,' projects were designed locally by the peasants according to the availability of local construction materials," often causing considerable waste. Apart from fertilizer application or water conservation, even in other aspects of cultivation, programmes have often been initiated by the Government and vigorously pushed through by party cadres without adequate consideration of the soil-climate complex and the varying economic and technical circumstances in different regions in the country (the resounding failure of the large-scale programme of introducing the double-wheeled, double-bladed plough, as cited by Perkins [28], is only one example among many), and sometimes apparently sensible policies laid down by the central leadership has been carried to an absurd extreme by unskilled but over-zealous cadres (for example, in following the principle of deep ploughing emphasized in Mao's 'Eight Point Charter,' in some areas ploughing was carried to a depth of six feet).

In India also, as the different Programme Evaluation Reports to the Planning Commission have amply testified, there have been serious shortcomings not only in the input distribution and extension service aspects of agricultural programmes but also in the technical suitability or local adaptability of various items in those programmes. Water, fertilizer or seed programmes have been pushed without sufficient consideration of local soil-climate conditions, cropping patterns, cultivating practices and the crucial complementarities in the use of different factors of production. Farmers have often refused to adopt new inputs and technology, not out of irrationality, ignorance or fatalism, but due to a better

appreciation of their local unsuitability or technical complementarity than is to be found in the administrative officials pushing those programmes (apart from the risk factors involved)).³³ Programmes have also suffered from a lack of coordination among different agencies engaged in research, administration, extension, and business and marketing in the field of agriculture.

In China, as we have noted, some of the technical deficiencies in agricultural programmes became more pronounced in the Great Leap Forward period. But the failures and excesses of the Great Leap should not lead us to overlook the fact that the underlying strategy of the Leap involving mass mobilization of (especially seasonally) underemployed rural labour on labour-intensive investment projects like irrigation, flood control, land reclamation, contour bunding, terracing, levelling, and road building is in principle basically sound in overpopulated agrarian economies like China or India. ^{the M.I.T. Team in India} The Indian Plans, ^{and even the} Ford Foundation Agricultural Production Team in India in 1959, have endorsed very similar policies after having pointed out that a vast amount of such rural construction projects could be undertaken with very little extra equipment. While we have duly noted how out of the staggering amounts of earthworks constructed by mass mobilization of labour in China in the Great Leap Forward period a significant proportion was ineffective in their intended purpose of coping with floods or droughts, it is worth mentioning at this point that no other country in recent history (not even the Soviet Union) has even attempted mobilization of rural labour on agricultural capital projects on such a massive scale, and the consequent organizational and economic stresses and strains should be judged in that context. In comparison the Indian performance with respect to the rural

³³ See e.g., S. Dasgupta, Producers' Rationality and Technical Change in Agriculture with Special Reference to India, unpublished Ph.D. Thesis in London School of Economics, 1964.

works programmes has been very poor.

In connection with mobilization of labour on construction of rural 'overhead' capital, it is important to point to the incentive effects of the different patterns in the distribution of benefits from these projects in the two countries. In India, as in pre-Communist China,³⁴ a major problem in mobilizing labour on such projects is that those who work on them do not receive proportionate benefits from them.³⁵ As reports after reports of the Programme Evaluation Committees have stressed, most of the benefits from Community Development Projects in India have accrued to the richer farmers. No wonder that the mass of poor peasants and agricultural labourers do not feel excited by these Projects. In irrigation projects also, the distribution of water is very much inequitable³⁶ and is a major reason of the poor maintenance of field channels. Through cooperative management of cultivation the Chinese have minimized this problem of conflicting self-interest between workers and beneficiaries of a rural capital project.

The emphasis in Indian Community Development Projects has been on coordinated administrative action by the Government agencies and not on any programme deliberately planned to effect any change in the rural institutional framework. The village level workers and extension officers are not merely ill-paid and over-worked; they have to operate within a severely constrained institutional set-up. The overenthusiastic but technically incompetent Chinese party cadre in his visions of unprecedented socialist transformation attempts too much and quite often fails. The underenthused Indian village-level worker does and can, under the given constraints, attempt too little.

³⁴See, for example, Yang [42], p. 26.

³⁵This has been noted by, among others, Perkins [28] and ECAFE [9], pp. 48-52.

³⁶See, e.g., Thorner [39] on the water distribution from Sarda Canal in U.P.

IV

The discussion of the institutional framework in which agriculture operates inevitably brings us to the question of land policy in the two countries and their important differences in this respect. Let us first take the case of India.

A great deal of land legislation has been undertaken in India in the last two decades. The major objectives of land policy were the abolition of intermediary tenures, reform of the tenancy system, including fixation of fair rent at one-fifth to one-fourth of the gross produce and security of tenure for the tenant, extension of owner-cultivation, ceilings on land holdings making possible a redistribution of surplus land among landless labourers, consolidation of agricultural holdings and increase in the size of the operational unit to an economic scale through cooperative methods. These programmes have been enforced in part and have met varying degrees of success or failure.

The programme for the abolition of intermediaries has been carried out practically all over the country; about 20 million tenants of former intermediaries came into ^{relationship} direct \wedge with the State and became owners of their holdings. Far less effective has been the programme of tenancy reform. A considerable proportion of the total area cultivated is still under tenancy. From the 1961 Census it is found that of the total cultivated area in rural India the proportion of holdings under 'pure' and 'mixed' tenancy is 22.4%.³⁷

³⁷See P. S. Sharma [34]. The actual importance of tenancy in rural India may, however, be more important than suggested by this figure on account of two major reasons. Since the prevalence of tenancy is significantly higher in the wet, and therefore generally more productive, areas (including irrigated land) than in dry areas, the loss from tenant cultivation is more than what may be suggested from the all-India average figure.

According to an estimate by Sen and Varghese [33], for the areas with assured rainfall (of 1,150 mm. a year or more) the area covered by holdings under pure and mixed tenancy is 27.6% and for areas with extensive irrigation (with 50% or more of gross sown area under irrigation), it is as high as 35.3%.

Secondly, what may not have come out in official data is that land legislation in some areas has in fact driven underground some forms of tenancy, numerous cases of eviction of tenants have taken place under the guise of 'voluntary surrenders' and that informal arrangements have been made with share-croppers disguised as agricultural labourers. The high pressure of population on land as well as the balance of social and political forces in the countryside has made it possible for land owners to impose such arrangements on the landless and defenceless agricultural population. This has tended to defeat the major aim of pro-

The tenant-cultivator with insecure tenure has little incentive to undertake long-run improvements in the land he cultivates. Besides, his capacity to invest is seriously limited by high rents and limited access to even cooperative credit. The rents as fixed by tenancy laws are still very high in several States and in others the rents charged are generally much higher than the legal maximum. As for credit, among all the occupational categories based on agriculture the tenant cultivator figures the least in proportion to his importance among the beneficiaries of credit programmes.³⁸ This is mostly because even cooperative loans continue to be given generally against the mortgage of land, and there has not been any significant shift to the crop loan system in most States.

Among tenant farms a more acute incentive problem arises in the case of share-croppers. Little information on the extent of share-cropping is available from Census publications, but from National Sample Survey data for the 8th Round (1954-55), it seems that at least 56.5% of tenancy areas is under formal or informal share-cropping and that only 20.8% of tenancy areas may be definitely free from share-cropping. Share-cropping may thus be regarded as still the predominant form of tenancy in rural India.

Crop-sharing tenancy without cost-sharing (as is generally the rule in India) obviously involves an added disincentive problem in application of new agricultural inputs like chemical fertilizers, compared to the case of tenancy with fixed cash rent. It is easily shown why the share-cropper paying a very high proportion of his gross produce as rent may be reluctant to adopt a new input even when he knows that this will bring some addition to output. Sen and Varghese [33] cite from recent Farm Management studies the case of Thanjavur District in Madras where with 'moderate' response rates, the tenant receiving 40% of the share of the crop has

³⁸ See, for example, the Report of the Team for the Study of Community Development Projects and National Extension Service, Vol. II., p. 101.

little incentive to apply the second one-third of the package of improved practices and none at all to apply the last third.

Of course, it is availability, and not tenurial disincentive, that is the major bottleneck for the expansion of the use of new inputs like fertilizers. But share-cropping gives rise to the problem of inefficient allocation of a given total amount of fertilizers among different farms. Under the existing tenurial conditions there will be "too much" fertilizers on owner-cultivator areas and too little on share-cropped areas. In principle, this particular problem of mis-allocation of a given total of fertilizers will, of course, disappear if all land were share-cropped with the same proportional shares. This point is relevant in a comparison between China and India, since in view of an agricultural tax fixed in proportion to output the Chinese cooperative farm may also be said to be operating under a kind of share-cropping system (with the share³⁹ going to the Government). The Chinese agricultural tax has a disincentive effect on the total amount of fertilizer demand,⁴⁰ but because of its uniformity over cultivated areas the mis-allocation problem we have referred to is avoided.

Leaving aside the problem of tenancy, a major affliction of Indian agriculture has been and still is the prevalence of small and fragmented holdings.⁴¹ According

³⁹The share is, however, relatively small; the agricultural tax rate was about 15.5% of output in the 1950's.

Besides, the tax is fixed according to the so-called 'normal' yield of land; i.e., the amount the land should produce in an ordinary year. This considerably reduces the disincentive effects.

⁴⁰It has been calculated by Jung-Chao Liu [20] from data on relative price and yield response functions of rice to Ammonium Sulphate that with the 15.5% proportional agricultural tax rate the Chinese farm gains only 41.2% of the increase in revenue when 15 kg. of N is applied per hectare of rice production, 33.1% of increase in revenue when 30 kg. of N is applied per hectare and only 9.8% of increase in revenue when 60 kg. of N is applied per hectare.

⁴¹Holdings get progressively smaller through the operation of the law of inheritance. Legislation has been adopted in several States to prevent subdivision below a prescribed minimum size. But on account of excessive pressure on land, such laws have not been effective at all.

to National Sample Survey 16th Round data on Land Holdings for 1959-60, 30.6% of the total area operated is in holdings of less than 7.5 acres, 53.7% is in holdings of less than 15 acres, 75.6% is in holdings less than 30 acres. A substantial proportion of cultivated area is thus being operated in holdings that are 'uneconomic' by most standards.⁴² Besides, compared to large farmers, small farmers suffer from extra disadvantages in getting enough supplies of credit, inputs, and technical assistance. Although there has been some improvement in cooperative servicing in recent years, particularly in credit, marketing, and provision of agricultural supplies, many of the cooperatives tend to be dominated by the larger farmers and traders who take the lion's share of the facilities, thereby defeating one of the major aims of the cooperative movement.⁴³

Apart from being small, the holdings also consist of widely scattered fragments. According to National Sample Survey 16th Round data for 1959-60, the average number of parcels per operational holding in India is 5.82 and the average area of a parcel is 1.14 acres. Under the Five-Year Plans, up to 1964-65 a total of only about 55 million acres of area has been consolidated.

Up to the middle of the 1950's, Chinese agriculture was also characterized by the prevalence of small, uneconomic, and widely fragmented holdings. In pre-Communist China 60% of the farms averaged less than 3 acres. According to J. L. Buck's survey [2] in 22 Chinese provinces the average farm in 1929-33 contained only 4.23 acres. Because of the inheritance practices and the extreme pressure of population on land, the situation must have worsened in the subsequent two

⁴²It has been calculated on the basis of Farm Management Studies data that the minimum size of holding for employing a pair of bullocks fully is about 7.5 acres, and that for yielding a minimum net farm business income of Rs. 1200 per family is about 15 acres under average Indian conditions.

⁴³For example, in 1961-62 the proportion of annual borrowings from cooperatives to aggregate annual borrowings by all rural households increased uniformly from 4% for the lowest asset group to 20.5% for the highest asset group, according to All-India Rural Debt and Investment Survey data (see Reserve Bank of India Bulletin, September 1965),

decades. As for fragmentation, according to Buck's survey, the average number of fragments per farm was 5.6 and the average distance of the fragments from the farmstead was about half a mile. As for tenancy, according to Buck's survey, 28.7% of cultivated land was rented and only 54.2% of the farmers owned their land. The Land Reform of 1949-52 expropriated the holdings of the landlords (which constituted nearly 40% of cultivated land) and redistributed a total of 116.7 million acres of land among 300 million poor and landless peasants. The resultant land situation was still marked by very small farms. An official survey in 1954 revealed that about 24% of total cultivated area was being operated by households having, on an average, 2 acres of land (and one half of a draft animal and one third of a plough) and only 3.2% of cultivated area was being operated by "rich" peasant households having on an average 5.8 acres of land (and two draft animals and one plough). This was a situation much worse (from the production efficiency point of view) than in India in the same period, so far as the size of holding is concerned.

Between 1953 and 1957 the small fragmented peasant farms in China were replaced in turn by mutual aid teams (with pooling of labour and other resources, labour reward fixed in work-day units, full private control over landholdings), agricultural producers' cooperatives 'of the less advanced type' (pooling of both land and labour, peasants retaining their title and rights to the land, land share distributed according to size of owned land-holding, labour reward in terms of work-day units, and a common accumulation fund) and then the collective farms or the agricultural producers' cooperatives 'of the more advanced type' (nominal private ownership of land but no land share in income, joint management and cultivation, small garden plots permitted to private members for raising vegetables and livestock with rural free markets to sell the produce). A further stage in the socialization of agriculture was reached in 1958 with the introduction of communes. A number of collectives (on the average of 30) was amalgamated into communes having an average

membership of 4 to 5 thousand households. The basic unit in agriculture was enlarged to organize mass mobilization of rural labour on soil and water conservation projects and local industries and to coordinate economic and administrative functions at the local level. Private garden plots and rural free markets were abolished. Peasants were paid both in money and in kind, determined partly by work done (relative to the income of the whole commune) and partly by 'free supply.' Since 1960, after the agricultural crisis, there was a gradual movement back to smaller agricultural units. The production team, with an average membership of 60 to 80 households (which is much less than a half of the size of even the producers' cooperatives of 1955-56) has gradually become the basic unit for resource allocation and economic decision-making, although the commune has remained as a unit of local government. The private garden plots and the rural free market for subsidiary products have been restored. The partial 'free supply' system in distribution has disappeared.

Let us briefly discuss the possible general impact of these institutional reorganizations on production efficiency in agriculture. First, the constant experimentations and reorganizations of rural institutions and the various policy shifts must have had disrupting effects on productive efficiency simply because of the uncertainties caused. This was probably inevitable in a period of transition in a country undertaking a fundamental rural transformation on an almost unparalleled scale, continuously groping for an optimum agrarian unit given the political and economic goals. Secondly, there must have been a considerable incentive problem from the point of view of individual peasants as they became more removed from their connection with the land and as their labour reward became more removed from the work they performed with each enlargement in the size of the basic unit of agricultural planning and income distribution. The disincentive problem may have been much less serious in recent years with the small production team now generally accepted as the basic unit. Besides, as Hoffman [11] points out, along with collectivization of agriculture the Chinese have rationalized their payment schemes and

devised elaborate scaled work grades and piece-rate mechanisms to keep up material incentives. Except for a brief early phase of the communes when non-material incentives and distribution 'according to need' were emphasized, agricultural wage payments have generally been geared to the quantity and quality of labour.

Against whatever losses there might have been due to disincentives in collectivization, one should weigh the undoubted gains from the pooling and consolidation of former uneconomic and fragmented holdings. Consolidation of holdings removes a lot of division strips, assists in soil conservation measures and irrigation projects, and economizes use of animal and human labour. As for joint farming, even if technological economies of scale of the usual type are not significant under traditional methods of cultivation⁴⁴ there are some benefits apart from avoiding the serious problem of uneconomic holdings. One example is the case where the family farm is frequently obliged to diversify in crop pattern even when specialization is more profitable on the small piece of land, whereas the joint unit can get the advantages of specialization without ceasing to meet the varied consumption needs of its member families. In addition to all this, cooperative management may facilitate introduction of new inputs and technology, improvement in the rates of saving and investment⁴⁵ and mass organization of rural works meant to increase agricultural productivity. Some of these advantages have not materialized in China since the rural party cadres who controlled the cooperatives were not sufficiently skilled in agricultural technology; in their zeal for reform they often carried out undue encroachments on private incentives and in their constant attempt to show spectacular results often went for ill-fated crash programmes.

⁴⁴ There is some evidence in Indian Farm Management Studies data that land productivity is invariant with respect to the size of farm when holdings are corrected for fertility differences.

⁴⁵ An official survey in 1957 covering 228 agricultural cooperatives in 24 provinces showed that saving in these cooperatives came to about 15% of net income, and this marked a significant increase over earlier years.

Contrary to usual expectations, the socialization of agriculture does not seem to have significantly improved the agricultural sector's sales proportion of foodgrains to the non-agricultural sector in China. In a developing economy where foodgrains constitute the major component of an industrial worker's budget, the supply of foodgrains available to the non-agricultural sector is a crucial determinant of the pace of industrialization. And yet from Table 6 based on Ishikawa's [14] estimate it seems that the marketed proportion (including the amount paid in agricultural taxes) of foodgrains production has (in spite of significant year-to-year variations) in general declined in China in the 1950's, and although we do not have enough data for the subsequent period, on all indirect evidence the decline seems to have continued in the 1960's. Ishikawa thinks that the major factors responsible for this phenomenon are (a) very high income elasticity of demand for foodgrains on the part of the average farm household at the existing low levels of consumption, (b) more egalitarian income distribution pattern and (c) the Government's general reluctance to impose an extractive policy at the risk of social unrest and loss of production incentives (peasant unrest in 1954 and 1959--years when the marketed ratio of foodgrains was relatively high--immediately led to a softening of Government procurement policy).

Table 6

Marketed Ratio of Foodgrains Production in China (%)

1950	35.24
1953	37.74
1954	39.07
1955	34.22
1956	30.34
1957	30.69
Average for 1953-57	34.18
1958	26.94
1959	30.00

Notes and Sources of Data: See Appendix

It is interesting to note that in India also the marketed proportion of food-grains output has not significantly increased in recent years.

Table 7

Marketed Proportion of Cereals in India

	Gross Production of cereals (million tonnes)	Marketed Amount (million tonnes)	Marketed Proportion of Gross Production (%)
	(1)	(2)	(2)/(1)
1953-54	61.08	16.62	27.2
1961-62	70.95	18.59	26.1

Notes on Data: See Appendix

From the rough estimates in Table 7, we find that the marketed proportion of gross cereals production has slightly declined between 1953-54 and 1961-62, in spite of some increase in cereals production per head of agricultural population over those years. In all likelihood, the proportion might have declined further in more recent years.⁴⁶

This general failure of the marketed proportion of foodgrains output to rise in India may be explained by the following factors: (a) very high income-elasticity⁴⁷ of demand for foodgrains on the part of farm households, as in China or any other poor peasant economy, (b) withholding of grains on the part of middle and big farmers in expectation of higher prices, particularly in very recent years (this is a short-run factor), (c) increase in withholding capacity of these relatively

⁴⁶The Ministry of Food and Agriculture has some data relating to arrivals of food-grains at selected market centers in different parts of the country. If we take these market arrivals as a proportion of production in the districts which contain those markets, we find that the proportion has gone down between 1960-61 and 1963-64 for rice, wheat and jowar. This trend seems to have continued even in the bumper crop year of 1964-65. One should, however, note that a decline in market arrivals at these market centers may not necessarily mean a decline in the amount actually marketed, particularly since government procurement policy often drives away the flow of grains from these markets.

⁴⁷The income-elasticity of demand for foodgrains for the rural sector is between 0.5 and 0.7 on the basis of NSS cross-sectional data. See Gangulee et al [10].

better-off farmers on account of higher income and better credit and storage facilities, (d) shift in the cropping pattern towards cash crops enabling the farmer to retain more of his food crops, (e) small farmers with holdings below 10 acres (contributing about one-third to two-fifths of the total marketed surplus) who usually market a much higher proportion of their output than the size-group immediately above them (those with holdings of 10 to 15 acres)⁴⁸ in order to meet their minimum cash requirements need sell less when their money income goes up with rising price of grains.

V

In view of a number of factors complicating the operation of the two economic systems and the very short-run nature of the period under consideration, it is not possible to arrive at clear-cut conclusions about their relative performance. All we can do in this section is to point to some very rough, and obviously sweeping, generalizations that one may make on the basis of the discussion above. On the whole it seems that although in terms of absolute levels Chinese yield per acre as well as foodgrains production per capita exceeds that of India by a significant margin, the Indian rates of growth, both in agricultural production and land productivity, have been somewhat better than the Chinese. This is, however, subject to at least two major qualifications. One is, as we have already pointed out, that the period under consideration includes the weather-wise worst years for China and precedes similar years for India. Secondly, since the absolute levels of production and productivity are much smaller in India, it is probably not unexpected that her rates of growth will be larger. Much of the difference in the rates of growth may thus be explained by the appreciable differences in the initial base.

⁴⁸See Dharm Narain [26].

In provision of inputs like organic and inorganic fertilizers and irrigation water the Chinese performance has been much better than that in India. Both countries have devoted not a very low proportion of their total gross investment to the agricultural sector. But the effectiveness of this investment has been quite unsatisfactory on account of, among other things, technical deficiencies and faulty planning in both countries, and the excesses of overenthusiastic but unskilled party cadres in China and a very much restricted framework of village institutions and administrative set-up in India. In land policy much of the period under consideration was taken up in China in bold experimentations--with the inevitable advances and retreats--in search of the optimum size of land management in a backward peasant economy, while in India in spite of copious land legislation some of the crucial land relations have remained basically unaltered. The Chinese policy of moving away from age-old small-scale family farming and of emphasizing joint management of land and labour has, on the one hand, significantly strained peasant incentives, but on the other hand rid Chinese agriculture of the burden of uneconomically small and fragmented holdings, tenurial insecurity and crop sharing which still afflict a substantial part of Indian agriculture. The problem of ensuring enough marketed surplus of foodgrains to feed the non-agricultural sector has, however, remained unsolved in both countries, in spite of all changes in institutions and production.

From the limited amount of evidence we have been able to collect, it seems hazardous but not altogether baseless to maintain that by the end of the period under consideration the Chinese have created a better potential for agricultural development than the Indians in terms of farm inputs, capital formation, land institutions and developmental organization. By vesting planning, accounting and management authority in the small production team the Chinese now seem to have reached a fairly good compromise; the production team, which is less than half of the size of the producers' cooperatives of 1955-56, is large enough to make the unit of land management viable, but it is small enough not to stretch the connection

of reward and individual work very much. The problem of unskilled cadres will, of course, remain for some time, but with more and better training this may be less of a problem in the future.⁴⁹ For India one can no doubt expect that with the significant improvement in supplies of agricultural inputs and investment, Indian agricultural performance may be much better in the next decade than it has been in the past. But a large part of her development effort will remain seriously constrained by her backward institutional framework and archaic administrative set-up.⁵⁰

Whether the better potential for China will be effectively used or not will depend to a large degree on whether from time to time the Party does or does not avoid the temptation to force the pace of things in the face of technical feasibility, to go in for hastily conceived crash programmes or to bring about further re-organizations of land institutions without due consideration of peasant incentives.

Before ending our discussion we may also point out that in this paper we have concentrated on production performance in the two economies, and have generally ignored the question of distribution of income and wealth in the agricultural sector. Even in discussing the institutional framework, we have emphasized different aspects only in so far as they directly operate on production efficiency. No comparative study of two economies is complete without a consideration of the dis-

⁴⁹In recent years there has been a strong emphasis on the need for Party cadres to have administrative and technical competence. See, for example, Chao Han, 'Some Questions Concerning Party Cadre Policy,' Red Flag, No. 12, 1963.

⁵⁰The following extract from the recent Second Evaluation Report for the Intensive Agricultural District Programme (IADP) is an example of a very frequent criticism of Indian development programmes:

'One of the most serious obstacles that the IADP has to face is the archaic administrative system which obtains in the country. This system based essentially on checks and balances evolved in a different time and for a different purpose has proved woefully inadequate for any operation the aim of which is not to maintain the status quo, but to change it.'

Contrast this with the numerous cases of Party directives in China where the leaders try, sometimes in vain, to restrain the lower-level party cadres from overdoing things, from changing things too much and too hastily.

tribution patterns, but we have chosen not to discuss it here out of considerations of space as well as our belief that most people will hardly deny that the pattern of income and wealth is likely to be more egalitarian in China than in India. We may only note that the welfare effects of a more egalitarian distribution may be substantial in countries like India or China with millions of people at the near-substance level of consumption.

APPENDIX

Notes and Sources of Data for the Tables

Table 1: Figures in Table 1 refer to processed grains. To Chinese official output figures for unhusked grains we use a reduction factor of 0.85 for processing (this reduction factor was used by Chinese State Statistical Bureau for the average of 1953-57). Indian official figures are given in terms of processed grains.

Chinese grain statistics exclude soybeans but include, unlike in India, potatoes (in terms of 4-to-1 grain equivalents). Potatoes represent an inferior substitute for rice in South China, just as jowar and bajra for wheat in parts of India. Indian grain figures include pulses as well as cereals.

For China, the 1952 and 1957 figures are from State Statistical Bureau. Since 1960 Peking has not published grain output estimates in the domestic press. In 1966 several Peking officials have claimed the figure for 1965 as we have used; see, for example, Chinese News Summary, April 28, 1966, p. 1.

As for reliability, the 1957 figure is widely regarded even among Western observers as fairly reliable. A number of these observers, however, regard the 1952 figure as an underestimate due to incomplete coverage and inadequacies of the crop reporting system. O. L. Dawson, the former Agricultural Attache of the USDA gives an adjusted estimate of 170 million tonnes for 1952. Such an extent of underestimation in the official figure has not been found acceptable by others. In spite of deficiencies of the crop reporting system, there are not enough grounds to suspect underreporting on an organized scale in that period. In the absence of convincing alternative estimates, we have used the official figure for 1952 as it is. For 1965 the agricultural officer of U. S. Consulate-General in Hong Kong gives an alternative, lower, estimate of 180 million tonnes. But Perkins [29] has given convincing reasons why the Peking officials' claim for 1965 seems to be a better approximation of actual output.

The data for India are based on the officially revised index numbers of agricultural production (to take account of recent changes in coverage and methods of estimation) and the figures for 1952-53 and 1956-57 are derived by using these index numbers backwards from the official estimate of production in 1960-61.

Table 2: For India, calculations are made from the levels and indices of agricultural productivity given by the Ministry of Food and Agriculture. The Indian yield figures for total foodgrains are much lower than those for rice and wheat because of relatively low yields for pulses which are included in foodgrains. For China, the 1952 figures are calculated from State Statistical Bureau [36]; the 1965 figures are very rough estimates by Jones [17], p. 94 based on piecemeal official information and a lot of educated guesswork. The Japanese yields are estimated by Hayami and Yamada, as reported in Rosovsky [32].

The Japanese figures are, however, not strictly comparable with either the Chinese or the Indian, since the Japanese yields per hectare are in terms of arable land, not in terms of gross cropped area. Because of multiple cropping, figures for yield per hectare of gross cropped area in Japan must be lower than indicated in Table 2.

Table 3: For India the fertilizer consumption data are from The Fourth Five Year Plan, A Draft Outline and gross cropped area data from the Ministry of Food and Agriculture publications.

For China, the 1955 figure (which, incidentally, excludes Amonium Nitrate in

domestic production) is based on data in State Statistical Bureau [36]; the 1965 figure is calculated from estimates of fertilizer consumption based on sources in USDA as reported in Larsen [19], p. 246. In converting the Chinese figures of gross quantities of fertilizer materials into crop nutrients (N, P_2O_5 and K_2O) we have used a ratio of 5 to 1 for 1955 and 4.4 to 1 for 1965, a conversion method suggested by Dawson [6].

Table 4: Wholesale price indices are issued by the Office of the Economic Advisor to the Government of India; see Reserve Bank of India Bulletin, 1958, 1965, 1967.

The weights used for obtaining average price index for purchased consumables (cotton manufactures, edible oils, sugar, 'fuel, power, light and lubricant') are proportional to their percentage shares in monthly per capita consumer expenditure in the rural sector during the period from mid-1952 to mid-1956 (covered by 4th to 10th Rounds of National Sample Survey of Consumer expenditure).

Table 5: Sources :

- (a) FAO Production Year Book, 1958
- (b) Report of the Indian Fertilizer Distribution Enquiry Committee, p. 84.
- (c) Jung-Chao Liu [20], Tables 5 and 6. For China the government procurement price of rice in the predominant rice-producing area (East-Central region) and the market price for Ammonium Sulphate in terms of N are taken.

Table 6: Ishikawa [14], Table 8.

Both the amounts produced and marketed were in terms of processed foodgrains. The marketed amount includes agricultural taxes, the amount sold to State and Co-operative commerce and also the amount (relatively small since 1954) sold in free markets. For extensive notes on the estimates, see Ishikawa [14]. Our estimates are slightly different from those in [14], since in order to make our figures comparable to those in Table 7 for India, we have deducted a wastage factor of 4% for China (which seems to be the average wastage percent for foodgrains for the economy as a whole as suggested in Shen [35], Appendix). In other words, as in Table 7, the figures here roughly refer to the ratio of the total amount of foodgrains available for consumption in the non-agricultural sector to the total gross output of processed foodgrains. One might comment here that Ishikawa has used official grain output data (which are greatly inflated) for 1958 and 1959 in deriving his percentages. But Ishikawa thinks that this has not led to any significant under-estimation of the marketed ratios of production.

Table 7: There are no direct estimates of marketed amount of foodgrains on an all-India level. Column (2) is estimated indirectly from non-agricultural population's consumption data. According to 1951 census, 17.3% of total population was urban, 86% of urban population was non-agricultural and 18.5% of rural population was non-agricultural. Applying these percentages to the average of the mid-year population figures for 1951 and 1952 (as issued by the Office of the Registrar General of India), we estimate a total non-agricultural population of 110.6 million in 1951-52. According to 1961 census, 18% of the total population was urban, 92.8% of urban population was non-agricultural and 19.95% of rural population was non-agricultural. Applying these percentages to the average of the mid-year population figures for 1961 and 1962, we estimate a total non-agricultural population of 148.3 million in 1961-62. This implies an annual rate of growth of 3% in non-agricultural population between 1951-52 and 1961-62. Applying this rate of

growth to the 1951-52 figure, we estimate a non-agricultural population of 117.34 million in 1953-54. We then multiply these non-agricultural population figures by the per capita quantities of cereals consumed in the urban sector as given by National Sample Survey data for 7th and 17th Rounds (i.e. 12.5 kg. per month in 1953-54 and 12.5 kg. per month in 1961-62) to get estimates for the total quantity of cereals consumed by the non-agricultural population. From this quantity we deduct net Government distribution (total Government Issue of cereals minus total Government Procurement of cereals) to get an estimate of the amount of cereals consumed by the non-agricultural population that is currently supplied by the agricultural sector in the country. For this purpose we use, in the absence of better information, the average of total (net) Government distribution of cereals in 1953 (1961) and in 1954 (1962) for 1953-54 (1961-62). The amount we finally arrive at is taken as a rough estimate of the total quantity of cereals marketed by the agricultural sector in the year concerned.

If we multiply the figure for non-agricultural urban population by the NSS per capita cereals consumption figure for the urban sector and that for the non-agricultural rural population by the NSS per capita cereals consumption figure for the rural sector, then the estimates of marketed amount of cereals will be larger than those shown in column (2) in either year. But we have decided not to use these in the Table since (a) the NSS per capita cereals consumption figures for the rural sector are sometimes regarded as substantial overestimates (see, for example, S. S. Madalgi, 'Foodgrains Demand Projections,' Reserve Bank of India Bulletin, January 1967) and (b) the non-agricultural rural people often themselves produce some part of their cereals needs, so that a part of their cereals consumption is not provided by the marketed surplus of the agricultural sector. In view of these, use of the NSS consumption figure for the rural sector (which is larger than that for the urban sector) might unduly inflate the estimate for marketed amount of cereals.

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